CLAIMS

What is claimed is:

1. A sensor comprising:

a) a sensor head package containing a micromachined accelerometer comprising:

i) a base layer;

ii) an frame connected to and above said base layer;

iii) a proof mass within said frame;

iv) a flexure connecting said proof mass to said frame, said flexure including a piezoresistive element; and

v) a silicon encapsulation layer above said frame, said proof mass and said flexure, wherein said proof mass and said flexure are released from said base layer and from said encapsulation layer after deposition of said encapsulation layer; and

b) circuitry electrically connected to said piezoresistive element and remotely disposed from said sensor head package.

2. The sensor of claim 1, wherein a largest linear dimension of said sensor head package is less than about 0.5 mm.

3. The sensor of claim 1, wherein said sensor head package is configured for implantation into a middle ear.

4. The sensor of claim 3, wherein said sensor head package is configured as a replacement for one or more ossicular bones.

5. The sensor of claim 1, wherein said sensor head package includes a barb.

6. The sensor of claim 1, wherein said sensor head package has a pointed tip.

7. The sensor of claim 6, further comprising a flexible needle shaft having an end affixed to a surface of said sensor head package facing away from said pointed tip.

8. The sensor of claim 7, further comprising at least one wire running along said shaft and connecting said sensor head package to said circuitry.

9. The sensor of claim 1, further comprising a passivation layer disposed on said piezoresistive element.

10. The sensor of claim 1, wherein said flexure is coated with a passivation layer.

11. The sensor of claim 1, wherein said proof mass is substantially rectangular.

12. The sensor of claim 1, further comprising a bond pad disposed on top of said encapsulation layer and substantially laterally aligned with said proof mass.

13. The sensor of claim 1, wherein a gap separating said proof mass from said frame is about 2 microns.

14. The sensor of claim 1, wherein said base layer has a thickness of about 200 microns.

15. The sensor of claim 1, wherein said proof mass includes holes.

16. The sensor of claim 1, further comprising an electrically isolated vertical contact within said encapsulation layer.

17. The sensor of claim 1, wherein said sensor head package does not include any electrical circuit element other than a resistor, a capacitor, or an inductor.

18. A method of fabricating a sensor, the method comprising:

a) depositing an accelerometer layer above a base layer;

b) defining a frame, a proof mass and a flexure in said accelerometer layer, said proof mass being within said frame and said flexure connecting said proof mass to said frame;

c) defining a piezoresistive element in said flexure;

d) depositing a silicon encapsulation layer above said frame, said proof mass and said flexure;

e) releasing said flexure and said proof mass from said base layer and from said encapsulation layer to provide a micromachined accelerometer, said releasing performed after said depositing a silicon encapsulation layer;

f) packaging said micromachined accelerometer within a sensor head package; and

g) positioning circuitry remotely from said sensor head package, wherein said circuitry is electrically connected to said piezoresistive element.

19. The method of claim 18, wherein a largest linear dimension of said sensor head package is less than about 0.5 mm.

20. The method of claim 19, wherein said releasing comprises vapor-HF etching.

21. The method of claim 20, further comprising passivating said piezoresistive element by thermal oxidation.

22. The method of claim 18, further comprising passivating said accelerometer by thermal oxidation subsequent to said releasing.

23. The method of claim 18, wherein said proof mass is substantially rectangular.

24. The method of claim 18, further comprising depositing a bond pad on top of said encapsulation layer and substantially laterally aligned with said proof mass.

25. The method of claim 18, wherein a gap separating said proof mass from said frame is about 2 microns.

26. The method of claim 18, further comprising thinning said base layer to a thickness of about 200 microns.

27. The method of claim 18, wherein said sensor head package does not include any electrical circuit element other than a resistor, a capacitor, or an inductor.